

In re Patent Application of:

**WILSON ET AL**

Serial No. 10/647,558

Filed: 08/25/2003

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#### IN THE CLAIMS

1 (currently amended) A transmitter for providing a wavelength stabilized output signal having a wavelength  $W_s$  comprising:

- a package for housing electronic and optical components;
- a light source disposed within the package for providing the output signal;

- a photodetector disposed within the package in close proximity to the light source, wherein at least a portion of the output signal is optically coupled to the photodetector;

- switching means for changing a bias on the photodetector between forward bias mode and reverse bias mode, whereby the photodetector provides an indication of the output power of the light source output signal when the photodetector is in the reverse bias mode, and a signal that is related to the temperature and output power of the light source when the photodetector is in the forward bias mode;

- a temperature sensor disposed outside of the package for providing a signal indicating an ambient temperature about the package;

- a feedback circuit utilizing the indication of the output power from the photodetector and the signal indicating the ambient temperature from the temperature sensor to form a power control signal ~~to send a feedback signal~~ to adjust the output power of the light source, and utilizing the signal related to the temperature of the light source from the photodetector and the signal indicating the ambient temperature from the temperature sensor to form a temperature control signal for adjusting the temperature of the light source thereby adjusting the wavelength thereof; and,

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a memory circuit operationally coupled to the feedback circuit and the temperature sensor for storing a look-up table comprising a plurality of stored values, said stored values corresponding to control voltages for adjusting the feedback temperature control signal at a plurality of different ambient temperatures about the package and maintaining the wavelength of the light source substantially constant at the wavelength  $W_s$  when the power of the light source changes and/or when the temperature about the light source changes.

2 (currently amended): A transmitter as defined in claim 1, wherein the stored values are test values determined by testing said transmitter during manufacture at ~~a~~the plurality of different ambient temperatures, while maintaining the output wavelength of the output signal at the wavelength  $W_s$ .

3 (original): A transmitter as defined in claim 1, wherein the stored values are predetermined statistically.

4 (currently amended): A transmitter as defined in claim 2, further comprising a thermo-electric cooler (TEC) for varying the temperature and thereby the wavelength of the package light source in dependence upon the temperature ~~a TEC~~ control signal, which is based on the signal related to the temperature of the light source and the ambient temperature about the package.

5 (currently amended): A transmitter as defined in claim 4, wherein the ~~TEC~~ temperature control signal is derived from at least a stored test value within the lookup table, and the signal related to the temperature of the light source.

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- 6 (previously presented): A transmitter as defined in claim 5, wherein the stored test value is selected in dependence upon an ambient temperature outside the package.
- 7 (original): A transmitter as defined in claim 6, wherein the stored test value is converted to a voltage, and said voltage is compared with the signal related to the temperature of the light source to produce a difference signal for provision to the TEC for the control thereof.
- 8 (currently amended): A transmitter as defined in claim 4, wherein the ~~photodiode~~ photodetector is configured to receive light from the light source during a forward biased mode of operation, and wherein the stored values account for the output power of the light source received by the photodetector during the forward biased mode of operation.
- 9 (original): A transmitter as defined in claim 1, wherein the package is hermetically sealed.
- 10 (currently amended): A method of manufacturing a laser transmitter having, in operation, an output signal with a substantially constant wavelength  $W_c$ , said method comprising the steps of:
- providing a package for housing components;
  - providing within the package, a photodetector, and a light source in close proximity with the photodetector to be optically and substantially thermally coupled;
  - providing, within the package, switching means coupled with the photodetector for changing a bias on the photodetector between a forward bias mode and a reverse bias mode, to

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provide an indication of the output power of the light source output signal when the photodetector is in the reversed biased mode and for providing a signal that is related to the temperature of the light source in the forward biased mode; providing within the package, a thermo-electric cooler (TEC) electrically coupled to control circuitry for receiving input information for controlling the temperature of the light source;

providing a temperature sensor disposed outside of the package for providing a signal indicating an ambient temperature about the package;

providing within the package a memory array for storing test values, the memory array being electrically coupled to the temperature sensor and with the TEC, and the TEC being responsive to the test values;

determining at least one test value that will effectively maintain the output signal at a wavelength of  $W_c$  when the temperature of the package is varied, including the steps of:

varying a temperature of the environment about the package to a temperature  $T_{test}$  to vary a temperature within the package;

simultaneously monitoring the wavelength of the output signal while the transmitter is in operation;

while the photodetector operating in the forward bias mode, utilizing a plurality of potential test values at said temperature to determine a test value that will effect a change in the wavelength of the output signal so that said wavelength substantially becomes  $W_c$ ;

storing said at least one test value in the memory array at a location that is addressable by a digital value related to temperature  $T_{test}$ ; and,

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providing said control circuitry within the package with means to compare a voltage related to an addressed test value within the memory array with an output voltage received from the photodetector when in a forward biased mode of operation.

11 (currently amended) In a laser transmitter having a plurality of components including:

a photodetector,

a light source for generating an output signal with an output power, the light source being in close proximity with the photodetector to be optically and substantially thermally coupled therewith,

a switch coupled with the photodetector for changing a bias on the photodetector between a forward bias mode and a reverse bias mode , to provide an indication of the output power of the light source output signal when the photodetector is in the reverse bias mode, and for providing a temperature signal that is related to the temperature of the light source in the forward bias mode, said temperature signal being electrically coupled with control circuitry,

a TEC electrically coupled and responsive to said control circuitry for receiving input information for controlling the temperature of the light source,

a temperature sensor disposed outside of the package for providing a signal indicating an ambient temperature about the package;

a memory array for storing predetermined values, the memory array being electrically coupled with the control circuitry and to the temperature sensor, said photodetector, light source, switch, TEC, memory array and control circuitry

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~~components~~ being housed within a hermetic package, a method of manufacture comprising the steps of:

in operation, changing the temperature about the package to a plurality of different temperatures to vary a temperature within the package while monitoring the wavelength of the output signal,

while the photodetector operating in the forward bias mode, determining TEC control values for different temperatures that will substantially maintain the wavelength of the output signal at or about a predetermined desired operating wavelength  $W_c$ ; and,

storing said TEC control values in the memory array at locations addressable by digital values related to sensed temperature about the package.